

## CLAIMS

What is claimed is:

1. A power converter comprising:
  - a primary winding circuit;
  - 5 a secondary winding circuit coupled to the primary winding circuit, the secondary winding circuit comprising a secondary transformer winding in series with a controlled rectifier having a parallel uncontrolled rectifier;
  - 10 a control circuit which controls duty cycle of the primary winding circuit, the duty cycle causing near continuous flow of power through the primary and secondary winding circuits during normal operation but being reduced to cause freewheeling periods in other than normal operation; and
  - 15 a filter inductance of the secondary winding circuit that is sufficient to minimize ripple during normal operation but allows large ripple when the duty cycle is reduced.
- 15 2. A power converter as claimed in claim 1 wherein the controlled rectifiers are caused to be off during a portion of each cycle when the duty cycle is reduced.
3. A power converter as claimed in claim 1 wherein the duty cycle is reduced during start up.
4. A power converter as claimed in claim 1 wherein the duty cycle is reduced to 20 limit current.
5. A power converter as claimed in claim 4 wherein the duty cycle is a function of sensed current.

6. A power converter as claimed in claim 5 wherein the control circuit compares the duty cycle to a threshold and shuts down operation when the duty cycle drops below the threshold.
7. A power converter as claimed in claim 1 wherein the secondary winding circuit comprises plural secondary transformer windings.
8. A power converter as claimed in claim 1 wherein the primary winding circuit includes a single primary winding and the secondary winding circuit includes two secondary windings coupled to the single primary winding.
9. A power converter as claimed in claim 8 wherein the primary winding is in a full bridge circuit.
10. A power converter as claimed in claim 9, further comprising a capacitor in series with the primary winding.
11. A power converter as claimed in claim 1 wherein the control circuit compares the duty cycle to a threshold and shuts down operation when the duty cycle drops below the threshold.
12. A power converter as claimed in claim 1 wherein the converter provides no regulation during normal operation.
13. A power converter comprising:
  - a primary winding circuit;
  - 20 a secondary winding circuit coupled to the primary winding circuit, a secondary winding circuit comprising a secondary transformer winding in series with a controlled rectifier having a parallel uncontrolled rectifier; and

a control circuit which controls duty cycle of the primary winding circuit, the duty cycle being reduced as a function of sensed current, the control circuit comparing the duty cycle to a threshold and shutting down operation when the duty cycle drops below the threshold.

5 14. A method of converting power comprising:

providing power to primary and secondary transformer windings, there being a controlled rectifier having a parallel uncontrolled rectifier in series with the secondary transformer winding;

10 controlling duty cycle of the power to the primary winding, the duty cycle causing near continuous flow of power through the primary and secondary windings during normal operation but being reduced to cause freewheeling periods in other than normal operation; and

15 filtering the power converter output with a filter inductance that is sufficient to minimize ripple during normal operation but allows large ripple when the duty cycle is reduced.

15. A method as claimed in claim 1 wherein the controlled rectifiers are caused to be off during a portion of each cycle when the duty cycle is reduced.

16. A method as claimed in claim 14 wherein the duty cycle is reduced during start up.

20 17. A method as claimed in claim 14 wherein the duty cycle is reduced to limit current.

18. A method as claimed in claim 17 wherein the duty cycle is a function of sensed current.

19. A method as claimed in claim 18 wherein the control circuit compares the duty cycle to a threshold and shuts down operation when the duty cycle drops below the threshold.
20. A method as claimed in claim 14 wherein the power is applied to plural secondary windings.  
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21. A method as claimed in claim 14 wherein power is applied through a single primary winding and two secondary windings coupled to the single primary winding.
22. A method as claimed in claim 21 wherein the primary winding is in a full-bridge circuit.  
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23. A method as claimed in claim 22 wherein a capacitor is in series with the primary winding.
24. A method as claimed in claim 14 wherein the control circuit compares the duty cycle to a threshold and shuts down operation when the duty cycle drops below the threshold.  
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25. A method as claimed in claim 14 wherein the converter provides no regulation during normal operation.
26. A method of converting power comprising:  
20 providing power to primary and secondary transformer windings, there being a controlled rectifier having a parallel uncontrolled rectifier in series with the secondary transformer winding;

controlling duty cycle of the power to the primary winding, the duty cycle being reduced as a function of sensed current; and

comparing the duty cycle to a threshold and shutting down operation when the duty cycle drops below the threshold.

5 27. A power converter comprising:

primary and secondary transformer windings, there being a controlled rectifier having a parallel uncontrolled rectifier in series with the secondary transformer winding;

10 means for controlling duty cycle of the power to the primary winding, the duty cycle causing near continuous flow of power through the primary and secondary windings during normal operation but being reduced to cause freewheeling periods in other than normal operation; and

15 means for filtering the power converter output with a filter inductance that is sufficient to minimize ripple during normal operation but allows large ripple when the duty cycle is reduced.

28. A power converter comprising:

primary and secondary transformer windings, there being a controlled rectifier having a parallel uncontrolled rectifier in series with the secondary transformer winding;

20 means for controlling duty cycle of the power to the primary winding, the duty cycle being reduced as a function of sensed current; and

means for comparing the duty cycle to a threshold and shutting down operation when the duty cycle drops below the threshold.